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ABSTRACT

The "levels effect," the finding that the more central to the meaning of a passage an idea is the more likely that idea is to be retained, does not seem to hold for immediate recognition. Therefore, a study was conducted to test a model of information storage that predicted that when surface structure information was preserved in its original form subordinate ideas could be recognized as well as superordinate ideas. In the study, auditory presentation was used to reduce surface structure clues. Subjects, 36 native English speaking undergraduates enrolled in an introductory psychology class, were assigned to two treatment conditions. Both heard tape recorded central passages from two stories, but one completed recognition forms immediately and the other first completed a simple recall task for five minutes before filling out the forms. Results showed that retention declined significantly over time and that thematic importance also produced a significant effect on recognition. These results indicate that thematically central ideas must be stored differentially and that when there is an abundance of surface structure information (as in visual presentation), these cues obscure the differences in the availability of superordinate and subordinate ideas. (JL)

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Immediate Recognition of Thematically Central and Peripheral Ideas in Prose

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Paper presented at Southeastern Psychological Association Meeting, 1983

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Immediate Recognition of Thematically Central and Peripheral Ideas in Prose

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Abstract

The "levels effect" refers to the finding that the more central to the meaning of a passage an idea is, the more likely that idea is to be retained. Thirty-six undergraduate students were given a binary-choice recognition test immediately or 5-min. after auditory presentation of medium-length narrative stories. Story statements were divided into three levels of relative importance; distractors for each level of importance were equated for attractiveness. Contrary to virtually every previous study on the "levels effect" in immediate recognition, a significant "levels effect" emerged immediately after story presentation. When passages are presented visually (as in previous studies), visual memory for surface structure temporarily elevates retention for both central and peripheral ideas, thereby obscuring retention differences. If surface structure cues are less available (as in auditory presentation), immediate differences in the retention of superordinate and subordinate ideas become apparent. Results support the view that more central ideas are retained better because of differential storage, not differential retrieval.

The "levels effect," the finding that the more central to the meaning of a passage an idea is, the more likely that idea is to be retained, is one of the more reliable phenomena in prose learning (Johnson, 1970; Meyer & McConkie, 1973; Yekovich & Thorndyke, 1981). In recall studies, this phenomenon has been observed in nearly every investigation (but see Black & Bower, 1980). In recognition, however, the "levels effect" has often been reported when the recognition test is delayed (cf. McKoon, 1977; Caccamise & Kintsch, 1978), but never when recognition is immediate (McKoon, 1977; Miller, Perry & Cunningham, 1977; Caccamise & Kintsch, 1978; Walker & Meyer, 1980; Yekovich & Thorndyke, 1981). Two conflicting interpretations of the failure to find the "levels effect" in immediate recognition have been proposed. The first centers on retrieval processes (Walker & Meyer, 1980; Yekovich & Thorndyke, 1981). The "levels effect" is purported to be due to the differential positioning of ideas within hierarchical representational structures. Superordinate or thematically central ideas are stored at the top of these structures, and are thus more likely to be accessed during recall. Recognition is presumed to alleviate access problems, thereby giving no advantage to superordinate ideas during recognition testing. Thus recall-recognition differences in the "levels effect" are critical to the verity of this interpretation. On the other hand, Kintsch and his associates have argued that the failure to obtain the "levels effect" in immediate recognition is due to transient memory for surface structure information, which temporarily elevates memory for both superordinate and subordinate ideas. Although superordinate ideas are actually stored better, the initial abundance of surface structure cues helps subordinate information to be retained no worse than superordinate information initially. Later, after surface structure information is no longer available, relatively more robust representations for superordinate ideas should be evident. As evidence for this interpretation, Caccamise and Kintsch (1978) demonstrated that paraphrase memory but not verbatim memory was lower for subordinate ideas. Allegedly when the surface structure information was preserved in its original form (i.e., in the verbatim recognition condition), subordinate ideas could be recognized as well as superordinate ideas.

The surface structure interpretation leads to a simple test. Because memory for surface structure information is temporarily higher after visual presentation than after auditory presentation of sentences (Flagg & Reynolds, 1977), this interpretation leads to the prediction that the "levels effect" should be observed in immediate recognition if an auditory presentation of passages is used. Fewer surface structure cues should be available immediately after an auditory presentation, so subordinate ideas, which are less available, should be less recognizable. The retrieval interpretation of the "levels effect" again leads to the prediction that the "levels effect" will be observed in recall, but not in recognition.

Method

Subjects

Thirty-six undergraduate students enrolled in introductory psychology at Purdue University participated to receive course credit. Sign-up sheets posted the restriction that participants must be native English speaking.

Materials

The central portions of two stories, "The Sniper" and "The Shepherd's Daughter," were used as experimental passages. The edited versions of "The Sniper" and "The Shepherd's Daughter" contained 459 and 454 words, respectively. The story content was divided into statements (Rumelhart, 1976), which were then divided into three levels of relative importance on the basis of frequency of inclusion in summaries. The number of high-, medium-, and low-importance statements was 12, 20, and 28, respectively, in "The Sniper," and 14, 14, and 12, respectively, in "The Shepherd's Daughter." A contextually logical, stylistically compatible distractor was written for each statement. Through a complex scaling procedure described in Schultz and Johnson (1982), distractors were equated for difficulty across each level of importance. A recognition test form was prepared by randomly substituting distractors for OLD statements, with the restrictions that exactly half of the test sentences be OLD, that no more than two OLD or two distractor statements be contiguous, and that approximately half of the statements for each level of importance be OLD. An alternate form was then derived by substituting a distractor for each OLD statement in the first form, and by substituting an OLD statement for each distractor in the first form.

Procedure

Learners were randomly assigned to treatment conditions. Instructions for the binary decision recognition task were initially presented. A story was then presented via tape recorder at a rate of approximately 130 words per minute. Afterwards learners either began to complete recognition forms, or recalled Presidents of the U.S.A. for five-min., then completed recognition forms. Participants indicated whether they considered each test statement to be OLD or NEW, and indicated confidence in each response (1=unsure, 2=sure). The recognition test was unpaced.

Design

A 2 X 2 X 3 factorial design was used. Stories and retention interval (0- or 5-min.) were between-subject variables. Thematic importance (high, medium, or low) was the within-subject variable. Four dependent measures, d', hit rate (HR), false alarm rate (FAR), and corrected score (HR - FAR) were calculated.

Results

Data for two participants, both of whom heard "The Shepherd's Daughter," were excluded from analysis because these learners failed to understand instructions for the recognition task. Thus data for eight learners in each delay condition remained for "The Shepherd's Daughter," and data for nine learners in each delay condition remained for "The Sniper." Initial analysis of variance revealed that neither the main effect of stories nor any stories X treatment interaction approached statistical significance, so data were collapsed over stories. In the resulting 2 X 3 ANOVA for d' (which was calculated by determining the area under the memory operating characteristic, then converting area to the equivalent d' value), retention declined reliably from 0-min. ($\bar{X}$ = 1.63) to 5-min. ($\bar{X}$ = 1.37), F (1, 32) = 4.25, $p < .05$. Thematic importance also produced a statistically significant main effect, F (2, 64) = 10.56, $p < .001$. High-importance statements ($\bar{X}$ = 1.72) were recognized better than medium-importance statements ($\bar{X}$ = 1.51), which were recognized better than low-importance statements ($\bar{X}$ = 1.29). The

delay X importance interaction did not approach significance, $F(2, 64) < 1$ (see Handout). Results for HR and corrected score followed a virtually identical pattern (see Handout), except that in these other analyses retention interval did not reliably ($p > .05$) affect retention. In the analysis of false alarms, FAR increased as thematic importance decreased, $F(2, 64) = 4.16$, $p < .02$.

Discussion

The "levels" effect" emerged in immediate (and in slightly delayed) retention. These data suggest that the "levels effect" is not merely the result of differential retrieval for ideas of varying degrees of importance; this hypothesis would lead to the prediction of an absence of the "levels effect" in recognition. However ideas of higher thematic importance were recognized better at each retention interval. Thus these more thematically central ideas must be stored differentially. When there is an abundance of surface structure information for both superordinate and subordinate ideas (as in visual presentation), recognition for both types of ideas becomes so facilitated by these cues that differences in availability of both kinds of ideas become obscured. If surface structure cues are less available (as in auditory presentation), immediate differences in the retention of superordinate and subordinate ideas become apparent.

Finally, theorists have tended to assume that prose learning and retention are similar regardless of the modality in which information is presented. Current literature on memory for text and narrative passages focuses almost exclusively on the input of information via reading. Ironically, pioneer studies in prose learning and retention generally utilized auditory presentation (Bartlett, 1932; Gomulicki, 1956). Results presented in this paper suggest that important phenomena such as the "levels effect" may under some conditions be modality specific.

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	0-min delay			5-min delay		
	Importance			Importance		
	Low	Medium	High	Low	Medium	High
d'	1.37	1.71	1.88	1.22	1.33	1.58
HR	0.81	0.87	0.92	0.77	0.79	0.89
FAR	0.27	0.17	0.18	0.26	0.25	0.23
HR-FAR	0.54	0.70	0.74	0.51	0.54	0.66